REMARKS

In accordance with the foregoing, claims 1, 3, 7, and 18 have been amended. New claim 28 has been added. No new matter has been added. Claims 1-28 are pending and under consideration.

CLAIM OBJECTION

The outstanding Office Action objected to claim 7 because of informalities. Claim 7 has been amended to overcome the objections.

CLAIM REJECTIONS UNDER 35 U.S.C. §112

On page 2, paragraph 3, of the Office Action, clarifications regarding claim 1 are requested. Regarding the claim preamble reciting "a method of correcting digital frequency" while the body of claim 1 being drawn to "correcting the phase", applicants respectfully indicate paragraph [0006] of the specification as explaining the connection between these elements. As well known in the art, the frequency of a complex digital signal may be corrected by subjecting the samples extracted at discrete times k of the signal x(k) to phase rotations by respective angles z(k). Applicants respectfully submit that, as stated in claim 1, a frequency correction is performed by appropriate phase readjustment of the samples extracted at the discrete times k.

Additionally, the Examiner argues that the claim 1 recitation on page 2, lines 7-9, does not clearly indicate to what part of the invention "the composing angle and direction of rotation" are directed. In view of the amendments included in claim 1, applicants respectfully submit that the language has been clarified. The first vector is imaged onto a second vector by applying a CORDIC algorithm to perform a vector rotation with a predetermined angle (z(k)) composed by N different rotation angles (α_n) calculated according to $\arctan(2^{-n})$, n = 0, 1,..., N-1, and respectively provided with a sign (σ_n) of a direction of rotation.

The rejection of claims 3 and 18 in paragraphs 4 and 5 of the outstanding Office Action have been rendered moot by correcting $(-1)^2$ with the intended $(-1)^s$. In view of these corrections, applicants respectfully request withdrawal of the rejections.

The rejection of claims 2, 4-6, and 19-21 in paragraph 6 of the outstanding Office Action is moot in view of the above amendments to their base claims.

CLAIM OBJECTIONS WITH ALLOWABLE SUBJECT MATER

On page 11, paragraphs 18-19, claims 2, 4-6, 11-17, 19-21 and 24-27 have been rejected as being based on rejected base claims, but indicated as allowable if rewritten in

independent form. Applicants acknowledge with appreciation the indication of allowable subject matter. However, since applicants consider that claims 1 and 7, from which claims 2, 4-6, 11-17, 19-21 and 24-27 depend, define patentable subject matter, claims 2, 4-6, 11-17, 19-21 and 24-27 are maintained in dependent form at the present time.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

In the outstanding Office Action, claim 1 was rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,884,265 to Schroeder et al. (hereinafter Schroeder), in view of "The Cordic Trigonometric Computing Technique" IRE Transactions on Electronic Transactions on Electronic Computer, Vol. EC-8, pp330-334, September 1959 (hereinafter Volder). Applicants strongly disagree with the position expressed in paragraph 9 of the outstanding Office Action that Schroeder discloses "processing an N-step CORDIC algorithm so that a frequency of a signal (x(k)) is altered at a predetermined frequency" in Fig. 13, element 1312, col. 25 line 66 through col. 26, line 58, and "imaging the first vector onto a second vector with a second in-phase component (I_n) and a second quadrature component (Q_N) by applying a CORDIC algorithm to perform a vector rotation with a predetermined angle, wherein the second vector represents a signal with an altered frequency and phase" in FIG. 13, elements 1312, 1313, 1316, and 1318, col. 26, lines 16-41.

Schroeder is directed to a digital demodulator capable of demodulating a frequency multiplexed input signal. The input signal is sampled and the samples are translated by mixing with base band frequency signals to yield real and imaginary values corresponding to phase information in the original modulation signals. Then, the translated samples are filtered in real and imaginary digital filters, and the original modulation information is recovered by analysis of the position of vectors in the complex plane. A successive approximation technique is used to determine the angle of the vectors to the real axis.

Fig. 13 in Schroeder shows a block diagram of an FM detector card. The real and imaginary components are indeed stored in the element 1308 in Fig. 13 of Schroeder. In the element 1312, a CORDIC algorithm is applied to the vector having the real and the imaginary components. However, this CORDIC algorithm does not rotate the vector by a predetermined angle into the second vector as recited in claim 1. In Schroeder, the CORDIC algorithm in element 1312 simply performs a conversion from the real and imaginary components into a phase value (output at 1318) and the length R of the vector (output at 1313)[1]. There is no basis

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[1] See Schroeder, col. 26, lines 3-23.

to consider obtaining the phase and length of the vector output at elements 1318 that are not vectors as equivalent to rotating the vector into a second vector as alleged in the Office Action[2].

In Schroeder, the input frequency of the vector whose real and imaginary components are stored in the element 1308 is not altered by the CORDIC algorithm. Instead, the CORDIC algorithm performed in element 1312 followed by the differentiation performed on the extracted phase in element 1314 demodulates the frequency modulated input signal[3]. Further the signals 1313 and 1318 output by the CORDIC algorithm element 1312 do not represent an in-phase component and a quadrature component of a second vector or a second vector with an altered frequency. The signals output by the element 1312 represent simply the two polar coordinates (phase and length) of the first vector represented in I/Q (Re/Im) coordinates in element 1308.

Therefore, as Schroeder fails to teach or suggest using a CORDIC algorithm for a frequency correction and, more specifically, using the CORDIC algorithm for imaging a first vector with a first in-phase component and a first quadrature component into a second vector with a second in-phase component and a second quadrature component, wherein the second vector represents a signal with an altered frequency and phase, the subject matter of claim 1, is not rendered obvious by Schroeder et al., in combination with Volder.

The conclusory statement[4] starting on Office Action, page 4, line 19 regarding combining Schroeder and Volder ends with stating that Schroeder's objective of "[recovering] phase modulation information by analysis" is achieved, and not that the method of digital frequency correction of the present application can be achieved. The statement has no relevance in the matter of patentability of the present application. Applicants respectfully note that the USPTO has not met the *prima facie* burden of proof regarding a motivation to combine the applied prior art references.

However, even if the combination of Schroeder and Volder is assumed to be proper, the combination fails to teach every element of claim 1. Specifically, the combination fails to teach the claimed "processing an N-step CORDIC algorithm so that a frequency of a signal $(x(k))$ is altered at a predetermined frequency" and "imaging the first vector onto a second vector with a second in-phase component (I_n) and a second quadrature component (Q_N) by applying a CORDIC algorithm to perform a vector rotation with a predetermined angle, wherein the second

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[2] See Office Action mailed on 12/13/2005, page 4, lines 11-13.
[3] See Schroeder, col. 26, lines 24-30.
[4] See also MPEP 2144.08 III stating that "[e]xplicit findings on motivation or suggestion to select the claimed invention should also be articulated in order to support a 35 U.S.C. 103 ground of rejection. . . Conclusory statements of similarity or motivation, without any articulated rational or evidentiary support, do not constitute sufficient factual findings."

vector represents a signal with an altered frequency and phase." Accordingly, applicants respectfully traverse the 103 rejections based on these references[5] and request reconsideration.

In the Office Action, paragraph 10, claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Schroeder in view of U.S. Patent No. 6,192,089 to Corleto et al. (hereinafter Corleto). In paragraph 11, claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Schroeder in view of U.S. Patent No. 5,784,414 to Bruekers et al. (hereinafter Bruekers).

Claim 7 recites an adder adding a predetermined frequency value to an output value of the delay element, outputting a result indicative thereof and storing the result in a register, wherein the register value of the preceding cycle (k-1) is supplied to the delay element. To disclose these elements of claim 7, in both 103 rejections, the Office Action relies on the control sequence unit 820 in Fig. 8 of Schroeder containing a FIFO and an adder "is adding the input values including their frequencies to the output of the delay elements 814 to 816." However, the control sequence unit 820 does clearly not add any predetermined frequency value to an output value of any delay element 814, 815, 816. The control sequence unit 820 calculates a control value for controlling the tri-state MUX 804. This tri-state MUX 804 selects one of the inputs 810, 811, 812, or 813. In other words, if the adder comprised in the control sequence unit 820 would perform as required in claim 7, i.e., adding a predetermined frequency value to an output value of any delay elements 814, 815, 816, an output value of at least one of the delay elements 814, 815, 816 had to be input to this adder. However, no output of any delay element 814, 815, 816 is input to the control sequence unit 820 containing the adder. Therefore, it is impossible that the translator depicted in Fig. 8 teaches the above-cited elements of claim 7.

Neither of the secondary references (Corleto and Bruekers) cure the above mentioned deficiency of the primary prior art reference (Schroeder). The secondary references are used to teach "N micro-rotation blocks."

Therefore, both combinations, Schroeder and Corleto and Schroeder and Bruekers, respectively, fail to teach every element of the claimed invention. Specifically, the combinations fail to teach the claimed "an adder adding a predetermined frequency value (f•T/m) to an output value of the delay element, outputting a result indicative thereof, and storing the result in the register, wherein the register value of a preceding cycle (k-1) is supplied to the delay element." Accordingly, applicants respectfully traverse the 103 rejections based on these patents.

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[5] See MPEP 2142 stating, as one of the three "basic criteria [that] must be met" in order to establish a *prima facie* case of obviousness, that "the prior art reference (or references when combined) must teach or suggest all the claim limitations," (emphasis added). See also MPEP 2143.03: "All words in a claim must be considered in judging the patentability of that claim against the prior art."

Dependent claims 1-6 and 8-27 depending upon independent claims 1 and 7 are patentable at least by inheriting the patentability from the respective independent claims.

NEW CLAIM 28

New claim 28 is an alternative recitation of the method recited in claim 1. No new matter has been added, the new claim 28 being fully sup[ported by the originally filed specification and claims. Independent claim 28 is patentable over the above references for similar reasons as noted above for claim 1.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

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By: David M. Pitcher
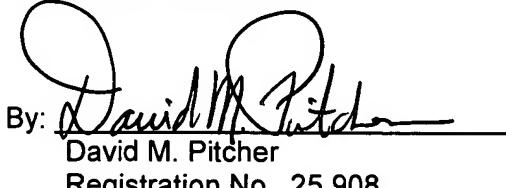
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